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Title: Apparatus for feeding gimmicks to a main conveyor of a conveyor line

The invention relates to an apparatus for feeding gimmicks to a main conveyor of a conveyor line.

Gimmicks are three-dimensional products whose dimensions are capricious to some extent. They are objects other than graphic products, which one would not primarily expect from a publisher's in a package of a newspaper, a magazine, or a letter with annexes. In this connection, a gimmick is understood not to be a CD, a DVD, a cassette or a like substantially rectangular product. For such substantially flat products, already feeding devices have been developed which can be described as pick & place devices which are provided with a hopper in which an operator can place stacks of the more or less flat products. This is not possible with gimmicks having a capricious three-dimensional shape.

Heretofore, gimmicks have therefore been placed on the main conveyor of a conveyor line for packaging, for instance, magazines, newspapers and the like, by hand. The maximum capacity that can be achieved in this way is about 2,500 gimmicks per hour. Since a normal packaging line for magazines nowadays features a capacity of about 18,000 products per hour, the addition of a gimmick to such a product leads to a dramatic decrease of the capacity of the packaging line.

The present invention contemplates an apparatus by means of which the gimmicks can be fed automatically, at least semi-automatically, to a main conveyor of a conveyor line.

To that end, the invention provides an apparatus which is provided with a sliding table having at least one free side where an operator can position himself, and with at least one conveyor, the at least one conveyor being provided with compartments each having such dimensions that one gimmick can be received therein, and wherein an inlet of the at least one conveyor aligns with the sliding table.

An operator randomly loads a number of gimmicks onto the sliding table, then manipulates them and each time slides a gimmick into a compartment of a conveyor. Preferably, more than one conveyor is provided, for instance four, such that the operator, during the travel of one conveyor, can load a compartment of another conveyor, stationary at that time, with a gimmick. Thus, minimal time is lost waiting for conveyor travel, since generally there is always a stationary empty compartment available which can be filled with a gimmick by the operator.

According to a further elaboration of the invention, the at least one conveyor can be a conveyor provided with projections, with a compartment being formed by the space between two successive projections.

Such conveyors provided with projections are relatively inexpensive and have as an advantage that they can convey a large number of different shapes. Preferably, each conveyor is bounded on opposite sides by upstanding edges, such that for each conveyor a channel is formed in which the gimmicks are advanced by the conveyor.

As already indicated above, preferably, several conveyors are provided. According to a further elaboration of the invention, the conveyors are drivable independently of each other. This provides the advantage that in use there is always bound to be a conveyor that is stationary, such that the compartment thereof that is situated adjacent the sliding table can be filled with a gimmick. Moreover, more than one conveyor provides for a greater buffer capacity. When for instance use is made of four parallel conveyors, and when, according to a further elaboration of the invention, in the or each conveyor in the active part there are 8-15 compartments, a buffer capacity of 32-60 gimmicks is obtained. When the frequency of conveyor travel is, for instance, once every 4 seconds, it takes 32-60 seconds for the total buffer capacity to be used up. That is amply sufficient time to fill the sliding table with new gimmicks.

According to a further elaboration of the invention, downstream of the discharge end of the or each conveyor, a receiving pocket may be provided in which a gimmick is receivable, the receiving pocket being provided with delivery means which are arranged for delivering the gimmick from the  
5 pocket to the conveyor line at a desired time.

With such a receiving pocket, the time of delivery can be accurately determined. As a result, the position of the gimmick relative to the product that is situated on the main conveyor is accurately determined.

This accuracy can be further enhanced when the delivery means  
10 actually perform a positive action to place the gimmick on the main conveyor. To that end, according to a further elaboration of the invention, the delivery means can comprise a bottom of the pocket which can be released. In addition, the delivery means can further comprise a pusher by means of which the gimmick is actively pushed onto the conveyor line. The  
15 releasable bottom of the pocket can comprise a flexible diaphragm which opens automatically under the influence of the force exerted by the pusher on the gimmick.

In order to prevent a situation where an empty compartment in one of the conveyors – which may occur, for instance, when the operator has  
20 accidentally failed to, or could not, fill a respective compartment - leads to non-delivery of a gimmick to the main conveyor, the apparatus, according to a further elaboration of the invention, can be provided with a control, while adjacent the discharge end of the or each conveyor a sensor is disposed which is arranged for sensing the presence and/or absence of a gimmick in a  
25 respective conveyor compartment situated adjacent the discharge end, or, if present, in the receiving pocket belonging to the respective conveyor, the control being arranged for driving the respective conveyor until the compartment and/or the receiving pocket possibly present is filled with a gimmick, such that in each case a gimmick is ready to be delivered. The  
30 sensors can be designed, for instance, as electronic eyes. It should be noted

that the sensor does not need to be arranged above the last compartment of a respective conveyor, but that it is also possible for the sensor to be arranged above a second last, third last or fourth last compartment, so that the conveyor can for instance travel three positions in succession when the  
5 sensor has sensed that the last three compartments are empty.

In order to effect a good positioning of the gimmicks on the main conveyor in the conveying direction, the apparatus, according to a further elaboration of the invention, is preferably provided with a control, the control being connected to an encoder which produces signals that are  
10 indicative of the position of the main conveyor in the conveyor line.

Further, for the positioning of the gimmicks in transverse direction, it is favorable when, according to a further elaboration of the invention, at least the position of the discharge end of the at least one conveyor transverse to the conveying direction of the main conveyor is settable with  
15 respect to the main conveyor.

Further elaborations of the invention are described in the subclaims and will be further clarified hereinafter on the basis of an exemplary embodiment, with reference to the drawing.

Fig. 1 shows a magazine with a gimmick placed thereon, which are  
20 packaged in a common film package;

Fig. 2 shows a perspective top plan view of an exemplary embodiment of the apparatus;

Fig. 3 shows a perspective top plan view of the sliding table and the upstream ends of the conveyors of the apparatus;

25 Fig. 4 shows a side elevation of a second exemplary embodiment according to the invention;

Fig. 5 shows a perspective view of the exemplary embodiment represented in Fig. 4, with omission of the receiving pockets;

30 Figs. 6a, 6b show a side elevation and a top plan view, respectively, of the discharge ends of the conveyors of a third exemplary embodiment;

Figs. 7a, 7b show a side elevation and a top plan view, respectively, of the transition between the sliding table and the conveyors; and

Fig. 8 shows a side elevation of a receiving pocket with a pusher.

Fig. 1 shows a photograph of a magazine T which is packaged in film F. In the package there is also a gimmick G.

Fig. 2 shows an exemplary embodiment of an apparatus for feeding gimmicks G to a main conveyor 1 of a conveyor line. Such a conveyor line can for instance be conceived of as a packaging line which is provided with a packaging station in which film is provided around a magazine. Along the packaging line, for instance feeders may be arranged to feed magazines and annexes to the main conveyor. In the present exemplary embodiment, the main conveyor is designed as a conveyor chain 3, provided with projections 2, which is arranged to advance magazines, newspapers or documents over a conveying surface 4.

The apparatus for feeding gimmicks G to the main conveyor 1 is provided with a sliding table 5 which is accessible for an operator 7 from a free side 6. Further, the apparatus is provided with four conveyors 8. Each conveyor 8 is provided with compartments 9 in which in each case one gimmick G is receivable. In the present exemplary embodiment, the compartments are separated from each other by projections 10. The width of a compartment is in the range of 80-300 mm. The length of a compartment is in the range of 80-300 mm. In the present exemplary embodiment, in an active, upwardly facing part of a conveyor 8 there are about nine compartments 9. The inlets 8a of the conveyors 8 align with the sliding table 5. In the present exemplary embodiment, the outlets 8b are provided with receiving pockets 11, which will be further discussed hereinafter. At one of the last compartments 9 of each conveyor 8, a sensor 12 is arranged by means of which it can be sensed whether the respective last compartment 9 is filled with a gimmick G. Further, the apparatus shown is provided with a control cabinet 13 and with a control panel 14 with a number of control

buttons 15. Preferably, the discharge end 8b of the conveyors 8 is displaceable relative to the main conveyor 1 in the direction indicated by X in the drawing. By varying the timing of delivery of a gimmick G, the position of the gimmick G relative to the projections 2, viewed in the conveying direction Y of the main conveyor 1, can be varied. Accordingly, the gimmick G can thus be accurately positioned relative to the products that are being conveyed by the main conveyor 1. The displacement of the discharge ends 8b relative to the main conveyor 1 can for instance be effected by displacing the whole apparatus relative to the main conveyor 1. To that end, the apparatus can for instance be placed on rails, which extend perpendicularly to the main conveying direction Y of the main conveyor 1. However, it is also possible that the sliding table 5 and the conveyors 8 are displaceably connected to a frame 16 which is fixedly set up on the floor.

Fig. 3 shows a top plan view of the sliding table 5 and the inlet ends 8a of the apparatus shown in Fig. 2. Fig. 3 further shows clearly that next to each inlet 8a, a warning light 17 is arranged which starts to burn when the associated conveyor 8 starts to move and which burns while this conveyor 8 moves. As already indicated above, the conveyors 8 are drivable independently of each other. Through the presence of the warning lights 17, the risk of injury to the operator 7 by a moving projection 10 of a conveyor 8 is prevented.

Figs. 4 and 5 show a second exemplary embodiment, in which the sliding table 5 is arranged at a downward inclination, while the conveyors 8 are arranged at an upward inclination. The angles of inclination are adjustable. Further, Fig. 4 clearly represents the receiving pocket 11, above which a pusher 18 is arranged to be moved up and down. In the exemplary embodiment of Fig. 4, the control cabinet 13 is fixedly arranged on the floor, and the conveyors 8 with the sliding table 5 are slidably connected with the control cabinet 13, such that displacement in X-direction is possible.

Figs. 6a and 6b show the discharge end 8b of a simple embodiment of the apparatus according to the invention, that is, of an embodiment without receiving pockets 11. Instead, a guide channel 19 is provided, along which the projections 10 can pass and over which the gimmicks G can slide on to be subsequently deposited onto the main conveyor 1. This channel can be a flexible flap.

Figs. 7a and 7b show an exemplary embodiment of a possible transition between the sliding table 5 and the conveyors 8. In this exemplary embodiment, this transition is formed by a flexible flap 20 over which the operator 7 can slide the products to an upstream compartment 9 of a conveyor 8. Provided in the flexible flap 20 are recesses 21 via which the projections 10 of the conveyor 8 can pass the flap 20. These recesses may also be integrated in the sliding table.

Fig. 8 shows a schematic side elevation of a receiving pocket 11 with pusher 18. The receiving pocket 11 is provided with a bottom wall 22 and a rear wall 23. The bottom wall 22 is operatively connected with the pusher 18 via a control rod 24. Upon downward movement of the pusher 18, the bottom wall 22 is pushed up by the control rod 24 in the direction of the arrow P. Simultaneously, the resiliently suspended pusher 18 pushes the gimmick G in downward direction onto the main conveyor 1.

Instead of the exemplary embodiment of the receiving pocket 11 as shown, the receiving pocket can be provided with a flexible bottom wall which is designed as a kind of diaphragm which opens under the influence of a force exerted on it. The pusher 18 can for instance produce this force by pressing on the gimmick G. Under the influence of the force, the diaphragm-like flexible wall will open, so that the gimmick G is delivered. In Fig. 8, a large gimmick G is represented, and a small gimmick G is shown in hatching.

An operator 7 now and then loads a number of gimmicks G onto the sliding table 5. Next, he manipulates the gimmicks G and slides them in

succession into a compartment 9 of a conveyor 8. In this way, the operator 7 fills the compartments 9 of the various conveyors 8. Next, the main conveyor 1 can be started and the conveyors 8 and the receiving pockets 11, if present, are driven such that a gimmick G is delivered in front of each projection 2 of the main conveyor 1. After that, the operator 7 can fill the empty compartments 9 sufficiently fast with gimmicks G to keep up with the speed of the main conveyor 1.

The control of the apparatus can be designed such that the position in Y-direction is determined by the timing of delivery. To that end, the apparatus may be provided with an adjusting button 15 by means of which the time of delivery of a gimmick G to the main conveyor 1 is settable, such that the delivery position of the gimmick G in the conveying direction Y of the main conveyor 1 is settable.

Further, the position in X-direction can be set by the proper positioning of the discharge ends 8b, or of the receiving pockets 11, relative to the main conveyor 1. The intermittently driven conveyors 8 can for instance make a traveling step every 2-6 seconds, for instance every 4 seconds, so that the operator 7 in each case has amply sufficient time to place a gimmick G in a compartment 9.

Depending on the number of conveyors 8 and the frequency of the traveling steps, a capacity of about 3,000-8,000 gimmicks G per hour can be realized, which is a considerable improvement over the capacity hitherto possible, which involved an operator 7 placing the gimmicks G directly onto a main conveyor.

It is clear that the invention is not limited to the exemplary embodiment described but that various modifications are possible within the framework of the invention as defined by the claims.